# Picloram

## HERBICIDE FACT SHEET

U.S. DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

This fact sheet is one of a series issued by the Bonneville Power Administration for their workers and the general public. It provides information on forest and land management uses, environmental and human health effects, and safety precautions. A list of definitions is included in Section VIII of this fact sheet.

## I. BASIC INFORMATION

**COMMON NAME:** picloram (potassium salt)

**CHEMICAL NAME:** 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1-H-imidazol-2-yl]-3-pyridinecarboxylic acid

Cas No. 2545-60-0

**CHEMICAL TYPE:** pyridinecarboxylic acid

**PESTICIDE CLASSIFICATION:** herbicide

**REGISTERED USE STATUS:** Restricted Use Pesticide in All States.

**FORMULATIONS:** Commercial herbicide products generally contain one or more ingredients. An inert ingredient is anything added to the product other than an active ingredient. Because of concern for human health and the environment, EPA announced its policy on toxic inert ingredients in the Federal Register on April 22, 1987 (52FR13305). This policy focuses on the regulation of inert ingredients. EPA's strategy for implementing this policy included the development of four lists of inerts, based on toxicological concerns. Inerts of toxicological concern were placed on List 1. Potentially toxic inerts/high priority for testing were placed on List 2. Inerts of unknown toxicity were placed on List 3, and inerts of minimal concern were placed on List 4.

The inert ingredients of the picloram formulations are not classified by the USEPA as inert ingredients of toxicological concerns to humans or the environment.
The contents of the picloram formulation are listed below:

Tordon® 22K Herbicide

| | |
|---|---|
| Picloram | 28.7 % |
| Inert | 71.3 % |

**RESIDUE ANALYTICAL METHODS:** EPA Method 600/4-88-039 515.1; 515.2;555.

## II. HERBICIDE USES

**REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES**: Picloram is registered for use in non-crop sites for selective and total plant control. For terrestrial use only.

### OPERATIONAL DETAILS:

**TARGET PLANTS:** Picloram is used for control woody plants on rights-of-ways and for the control of noxious weeds on rangeland.

**MODE OF ACTION:** Picloram is absorbed by the leaves, bark and roots, interfering with the plant's ability to produce proteins and nucleic acids.

**METHOD OF APPLICATION AND RATES:** Aerial and ground broadcast, spot, and localized applications at 1/4 pint to 1 quart per acre, not to exceed 2 quarts/acre/year (Tordon© 22K).

### SPECIAL PRECAUTIONS:

**TIMING OF APPLICATION:** For weeds, best results are achieved when the plants are small and actively growing.

**DRIFT CONTROL:** Care should be exercised not to overspray or apply the herbicide to adjacent non-target areas. Drift control is achieved by observing weather conditions and following label and sprayer instructions. Spray droplet size should be 150 microns or larger.

**RESTRICTIONS/WARNINGS/LIMITATIONS:** Do not enter the treated area until the spray has dried. Do not apply through any type of irrigation system. Do not graze or feed forage from treated areas for 2 weeks after treatment. Groundwater advisory. Surface water and drift advisory. Non-target plant advisory.

## III. ENVIRONMENTAL EFFECTS/FATE

### SOIL:

**RESIDUAL SOIL ACTIVITY:** The half-life of picloram is 90 days.

**ADSORPTION:** The K(oc) of picloram is 16.

**PERSISTENCE AND AGENTS OF DEGRADATION:** Picloram is moderately persistent in the plant and soils. The primary route of degradation is microbial activity.

**METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS:** Breaks down into carbon dioxide, oxalic acid, 4-amino-2,3,5-trichloropyridine and 4-amino-3,5-dichloro-6-hydroxypicolinic acid.

### WATER:

**SOLUBILITY:** 200,000 mg/l in water (pH 7 at 25° C).

**POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER:** Picloram is moderately persistent with a moderate soil adsorption coefficient. There is a very high potential for picloram to leach into groundwater and a high potential for surface water runoff.

### AIR:

**VOLATILIZATION:** No information.

**POTENTIAL FOR BYPRODUCTS FROM BURNING OF TREATED VEGETATION:** Not known.

## IV. ECOLOGICAL TOXICITY EFFECTS ON NON-TARGET SPECIES

**MICROORGANISMS:**

**ACUTE CONTACT TOXICITY:** $LD_{50}$ (honey bee contact) >100 µg/bee

**OVERALL TOXICITY: Practically Non-Toxic**

**PLANTS:** Contact will injure or kill target and non-target plants.

**AQUATIC VERTEBRATES:**

**ACUTE TOXICITY:** $LC_{50}$ (rainbow trout 96-hour) 13 mg/l

**ACUTE TOXICITY:** $LC_{50}$ (bluegill sunfish 96-hour) 24 mg/l

**OVERALL TOXICITY: Slightly Toxic**

**AQUATIC FRESHWATER INVERTEBRATES:**

**ACUTE TOXICITY:** $LC_{50}$ (*Daphnia magna* 48-hour) 68.3 mg/l

**OVERALL TOXICITY: Slightly Toxic**

**AQUATIC ESTUARINE/MARINE INVERTEBRATES:**

**ACUTE TOXICITY:** $EC_{50}$ (grass shrimp 96-hour) 306 mg/l

**ACUTE TOXICITY:** $EC_{50}$ (eastern oyster 96-hour) 18 mg/l

**OVERALL TOXICITY: Slightly Toxic**

**TERRESTRIAL ANIMALS:**

**AVIAN ACUTE ORAL TOXICITY:** $LD_{50}$ (mallard duck) >2250 mg/kg

**AVIAN ACUTE ORAL TOXICITY:** $LD_{50}$ (bobwhite quail) >2250 mg/kg

**AVIAN SUBACUTE DIETARY TOXICITY:** $LC_{50}$ (bobwhite quail) >10,000 mg/kg

**AVIAN SUBACUTE DIETARY TOXICITY:** $LC_{50}$ (mallard duck) >10,000 mg/kg

**MAMMAL ACUTE ORAL TOXICITY:** $LD_{50}$ (rat) >5000 mg/kg

**OVERALL TOXICITY: Practically Non-Toxic**

**BIOACCUMULATION POTENTIAL: Little Potential**

**THREATENED AND ENDANGERED SPECIES:** Federally listed terrestrial and aquatic plants may be adversely affected if the product is applied directly to the plants, or indirectly as the result of drift or leaching.

## V. TOXICOLOGICAL DATA

**ACUTE TOXICITY:**

**ACUTE ORAL TOXICITY:** $LD_{50}$ (rat) >5000 mg/kg

**ACUTE DERMAL TOXICITY:** $LD_{50}$ (rabbit) >2000 mg/kg

**PRIMARY SKIN IRRITATION**: Rabbit - Non-Irritant

**PRIMARY EYE IRRITATION:** Rabbit – Moderate Irritant

**ACUTE INHALATION**: $LC_{50}$ (rat) >8.11 mg/l

**OVERALL TOXICITY**: Category III – Slightly Toxic

**CHRONIC TOXICITY:**

**CARCINOGENICITY:** EPA Group E - No evidence of human carcinogenicity.

**DEVELOPMENTAL/REPRODUCTIVE:** Body weight gains/losses, abortions, excess salivation.

**MUTAGENICITY:** No adverse effects.

**HAZARD:** The end-use product labels for the picloram formulations carry the *Caution* signal word due to potential eye irritation.

## VI. HUMAN HEALTH EFFECTS

**ACUTE TOXICITY (POISONING):**

**REPORTED EFFECTS**: Damage to central nervous system, weakness, diarrhea and weight loss.

**CHRONIC TOXICITY:**

**REPORTED EFFECTS**: Liver damage.

**POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM CONTACTING OR CONSUMING TREATED VEGETATION, WATER OR ANIMALS:** See effects reported under acute toxicity.

**POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM INERT INGREDIENTS CONTAINED IN THE FORMULATED PRODUCTS:** None.

**HEALTH EFFECTS OF EXPOSURE TO FORMULATED PRODUCTS**: None reported .

**HEALTH EFFECTS ASSOCIATED WITH CONTAMINANTS:** None reported.

**HEALTH EFFECTS ASSOCIATED WITH OTHER FORMULATIONS:** None reported.

## VII. SAFETY PRECAUTIONS

**SIGNAL WORD AND DEFINITION:**

PICLORAM - **CAUTION** – CAUSES MODERATE EYE IRRITATION.

**PROTECTIVE PRECAUTIONS FOR WORKERS:** Applicators and other handlers must wear long-sleeved shirt and long pants, shoes plus socks.

**MEDICAL TREATMENT PROCEDURES (ANTIDOTES):**

**EYES:** Flush eyes with water for 15 minutes. Call physician.

**SKIN:** Wash all exposed areas with soap and water, call physician if irritation persists.

**INGESTION:** Call physician. Do not induce vomiting.

**INHALATION:** Remove to fresh air. Call a physician if breathing difficulty persists.

**HANDLING, STORAGE AND DISPOSAL:** Store at room temperature or cooler. Do not reuse container. Rinse container and dispose accordingly.

**EMERGENCY SPILL PROCEDURES AND HAZARDS:** Contain and sweep up material of small spills and dispose as waste. Do not contaminate water, food or feed by storage or disposal.

## VIII. DEFINITIONS

**adsorption** – the process of attaching to a surface

**avian** – of, or related to, birds

**CAEPA** – California Environmental Protection Agency

**carcinogenicity** – ability to cause cancer

**CHEMTREC –** Chemical Transportation Emergency Center

**dermal** – of, or related to, the skin

**$EC_{50}$** - median effective concentration during a bioassay

**ecotoxicological** – related to the effects of environmental toxicants on populations of organisms originating, being produced, growing or living naturally in a particular region or environment

**FIFRA** – Federal Insecticide, Fungicide and Rodenticide Act

**formulation** – the form in which the pesticide is supplied by the manufacturer for use

**half-life** – the time required for half the amount of a substance to be reduced by natural processes

**herbicide** – a substance used to destroy plants or to slow down their growth

**Hg –** chemical symbol for mercury

**IARC –** International Agency for Research on Cancer

**K(oc)** – the tendency of a chemical to be adsorbed by soil, expressed as: K(oc) = conc. adsorbed/conc. dissolved/% organic carbon in soil

**$LC_{50}$** – the concentration in air, water, or food that will kill approximately 50% of the subjects

**$LD_{50}$** – the dose that will kill approximately 50% of the subjects

**leach** – to dissolve out by the action of water

**mg/kg** – weight ratio expressed as milligrams per kilogram

**mg/**l – weight-to-liquid ratio expressed as milligrams per liter

**microorganisms** – living things too small to be seen without a microscope

**mPa –** milli-Pascal (unit of pressure)

**mutagenicity** – ability to cause genetic changes

**NFPA** – National Fire Protection Association

**NIOSH** - National Institute for Occupational Safety and Health

**NOEL -** no observable effect level

**non-target** – animals or plants other than the ones that the pesticide is intended to kill or control

**OSHA** - Occupational Safety and Health Administration

**Pa – Pascal (unit of pressure)**

**persistence** – tendency of a pesticide to remain to remain in the environment after it is applied

**pesticides** – substances including herbicides, insecticides, rodenticides, fumigants, repellents, growth regulators, etc., regulated under FIFRA

**PPE –** personal protective equipment

**ppm** – weight ratio expressed as parts per million

**residual activity** – the remaining amount of activity as a pesticide

**T&E –** Threatened and Endangered Species (from the Endangered Species Act)

**µg** – micrograms

**volatility** – the tendency to become a vapor at standard temperatures and pressures

## IX. INFORMATION SOURCES


Dow AgroSciences, Tordon® 22K Specialty Herbicide, Specimen Product Label, Label Code: D02-111-008, February 22, 1999

Dow AgroSciences, Tordon® 22K Specialty Herbicide, Material Safety Data Sheet, MSDS: 000380, October 6, 1998

EPRI, Determination of the Effectiveness of Herbicide Buffer Zones in Protecting Water Quality, EPRI Final Report TR-113160, 1999

Extension Toxicology Network, Pesticide Information Profile, Picloram, June 1996
http://ace.orst.edu/info/extoxnet/pips/ghindex.html

Extension Toxicology Network, Toxicology Information Briefs: Bioaccumulation, Revised 1993, http://ace.orst.edu/info/extoxnet/tibs/bioaccum.htm

Spray Drift Task Force, A Summary of Ground Application Studies, 1997 http://www.agdrift.com/publications/Body.htm

USDA Forest Service, Pesticide Fact Sheet, Picloram, November 1995
http://www.fs.fed.us/foresthealth/pesticide/index.html

USEPA, Office of Pesticide Programs, Reregistration Eligibility Decision, Picloram, EPA-738-R-95-019, August 1995
http://www.epa.gov/oppsrrd1/REDs/

USEPA, Office of Pesticide Programs, R.E.D. Facts, Picloram, EPA-738-F-95-018, August 1995
http://www.epa.gov/oppsrrd1/REDs/

# X. TOXICITY CATEGORY TABLES

**TABLE I: HUMAN HAZARDS**

| Category | Signal Word | Route of Administration | | | Hazard | |
|---|---|---|---|---|---|---|
| | | Acute Oral $LD_{50}$ (mg/kg) | Acute Dermal $LD_{50}$ (mg/kg) | Acute Inhalation $LC_{50}$ (mg/l) | Eye irritation | Skin irritation |
| **I (Highly Toxic)** | **DANGER (poison)** | 0–50 | 0-200 | 0-0.2 | corrosive: corneal opacity not reversible within 7 days | corrosive |
| **II (Moderately Toxic)** | **WARNING** | >50–500 | >200-2000 | >0.2-2 | corneal opacity reversible within 7 days; irritation persisting for 7 days | severe irritation at 72 hours |
| **III (Slightly Toxic)** | **CAUTION** | >500-5000 | >2000-20.000 | >2-20 | no corneal opacity; irritation reversible within 7 days | moderate irritation at 72 hours |
| **IV (Practically Non-toxic)** | **NONE** | >5000 | >20,000 | >20 | no irritation | moderate irritation at 72 hours |

After *Pesticide User's Guide*, Ohio State University, Extension Bull. No. 745, 1998.

**TABLE II: ECOTOXICOLOGICAL RISKS TO WILDLIFE (TERRESTRIAL AND AQUATIC)**

| Risk Category | Mammals Acute Oral $LD_{50}$ mg/kg) | Avian Acute Oral $LD_{50}$ (mg/kg) | Avian Acute Dietary $LC_{50}$ (mg/kg) | Fish or Aquatic Invertebrates Acute Concentration $LC_{50}$ (mg/l) |
|---|---|---|---|---|
| **Very Highly Toxic** | <10 | <10 | <50 | <0.1 |
| **Highly Toxic** | 10-50 | 10-50 | 50-500 | 0.1 – 1 |
| **Moderately Toxic** | 51-500 | 51-500 | 501-1,000 | >1 – 10 |
| **Slightly Toxic** | 501-2,000 | 501-2,000 | 1,001-5,000 | >10 – 100 |
| **Practically Non-toxic** | >2,000 | >2,000 | >5,000 | >100 |

Table II created from information contained in *Pesticides and Wildlife*, Whitford, Fred, et al., Purdue University Cooperative Extension Service PPP-30, 1998.

**Disclaimers and Other Legal Information:**

Mention of a trademark, vendor, technique, or proprietary product does not imply or constitute an endorsement of the product by the United States Department of Energy - Bonneville Power Administration (USDOE-BPA), its employees, and its contractors, and does not imply or endorse any product to the exclusion of others. In all cases, the user is required by law to follow all pesticide label instructions and restrictions.



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